GRIFFIN INTERNATIONAL INC

October 14, 1999

Mr. Chuck Schwer
Vermont ANR/DEC
Waste Management Division
103 South Main St. /West Building
Waterbury, VT 05671-0404

RE: Subsurface Investigation at A&D Service Station, Burlington, Vermont
(VT DEC Site #98-2521)

Dear Mr. Schwer:

Enclosed please find a copy of the report on the initial site investigation conducted at the above referenced site. I have forwarded a copy to you at the request of Mr. Dennis Boise of Champlain Oil Company.

Please contact me if you have any questions or comments.

Sincerely,

Beth Stopford
Environmental Engineer

Enclosure

cc: GI#39941497

P.O. Box 943 • Williston, VT 05495 • Phone 802-865-4288 • Fax 802-657-4129
59 Clinton Street • Plattsburgh, NY 12901 • Phone 518-562-4666 • Fax 518-561-6832

INITIAL INVESTIGATION OF SUBSURFACE PETROLEUM CONTAMINATION AT A & D SERVICE STATION

OCTOBER 11, 1999

Site Location:

A & D Service Center
1097 North Avenue
Burlington, VT

VTDEC SITE #98-2521
GI Project # 39941497

Prepared For:

Champlain Oil Company
P.O. Box 2126
South Burlington, VT 05401

(802) 864-5380

Prepared By:

GRIFFIN INTERNATIONAL

P.O. Box 943 / 20 Commerce Street Williston, VT 05495 (802) 865-4288

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I. INTRODUCTION

This report summarizes the initial investigation of suspected subsurface petroleum contamination at the A & D Service Center located on North Avenue in Burlington, VT (see location map in Appendix A). This investigation was conducted by Griffin International, Inc. (Griffin) for Champlain Oil Company (COCO), to address petroleum contamination detected during an underground storage tank (UST) closure inspection in September 1998. The Vermont Department of Environmental Conservation (VTDEC) requested that this work be completed in a letter to Mr. Dennis Boise of COCO, from Mr. Chuck Schwer of the VTDEC, dated January 1, 1999. The USTs and associated piping are owned by COCO, and COCO is the responsible party for contamination detected at the site (VTDEC Site #98-2521). The property upon which A&D Service Station is located is owned by Hauke Building Supply, Inc. of Burlington, VT.

Work conducted at the site included the installation of four groundwater monitoring wells, and the collection and laboratory analysis of groundwater samples from these monitoring wells. In addition, a sensitive receptor risk assessment was conducted to determine the risk that subsurface petroleum contamination at the site may pose to potentially sensitive receptors identified in the site vicinity. Work has been conducted in accordance with Griffin's *Work Plan and Cost Estimate for Subsurface Investigation at A & D Service Center* dated January 19, 1999. The Work Plan was approved by Mr. Dennis Boise in a meeting with Mr. Peter Schuyler of Griffin on March 8, 1999, and by Mr. Chuck Schwer of the VTDEC in a letter dated April 6, 1999.

II. SITE BACKGROUND

A. Site History

Subsurface petroleum contamination was detected in soil at the A & D Service Center during the closure of (2) 4,000-gallon gasoline USTs. Tank closure activities were conducted on September 29, 1998. Details of the closure inspection are outlined in the Underground Storage Tank Permanent Closure Form, which was submitted to the VTDEC on October 5, 1998 by Griffin International [1]. Adsorbed petroleum contamination was detected in the vicinity of each of the former USTs, as measured with a photoionization detector (PID). Concentrations of volatile organic compounds (VOCs) measured with the PID in the vicinity of the two 4,000-gallon gasoline USTs exceeded Soil Guideline Thresholds set by the Waste Management Division of the VTDEC (as per *Agency Guidelines for Contaminated Soils and Debris* [August, 1996]). The VTDEC standard for soils contaminated with gasoline is 20 ppm when measured with a PID. Maximum PID readings were obtained in soils directly beneath each of the two USTs.

In compliance with a request from the VTDEC that additional work be conducted at this site in order to determine the degree and extent of petroleum contamination, COCO retained the services of Griffin.

The property on which the A&D Service Station is located is part of a larger parcel owned by Hauke Building Supply, Inc. As part of development plans for this property, several groundwater monitoring wells have been installed in the area surrounding the A&D Service Station. Mr. David Hauke of Hauke Building Supply has requested that information resulting from this site investigation be provided to him. He has also given Griffin permission to access these monitoring wells in order to better assess contamination from the A&D Service Station.

B. Site Description

The A & D Service Center is located on the west side of North Avenue in Burlington, VT (see Site Location Map in Appendix A). The area surrounding the site is primarily commercial, with some residential buildings in the vicinity. The site is bordered to the north by the Ethan Allen Shopping Center and associated parking areas, and to the south by Leddy Park Drive. A True Value Hardware store and additional paved parking areas are located to the west of the site. Lake Champlain is located approximately 2500 feet west of the site.

There is one building on the subject property, occupied by a maintenance garage and a small convenience store. The site and most of the surrounding areas are paved.

C. Site Geologic Setting

According to the Surficial Geologic Map of Vermont [2], the site is underlain by pebbly marine sand. Soils encountered during monitoring well installation consisted primarily of sand overlying silt. Bedrock at the site is mapped as Dunham Dolomite [3].

Based on visual observation and review of the USGS topographic map [4], groundwater in the vicinity of the A & D Service Center would be expected to flow to the west toward Lake Champlain, following topographic contours.

III. INVESTIGATIVE PROCEDURES

A. Monitoring Well Installation

On July 15, 1999, four monitoring wells were installed by Adams Engineering of Underhill, Vermont using a Minirig vibratory drilling rig. Drilling and well construction were directly

supervised by a Griffin engineer. Soil samples were collected continuously from each boring. Each soil sample was screened for volatile organic compounds (VOCs) using an HNu Model PI-101 PID equipped with a 10.2 eV bulb. Soils were screened using the Griffin Jar/Polyethylene Bag Headspace Screening Protocol, which conforms to state and industry standards. Contaminant concentrations and soil characteristics were recorded in detailed boring logs by the supervising Griffin engineer (see the Well Logs in Appendix B).

The monitoring wells (MW1, MW2, MW3, and MW4) were installed to help better define groundwater flow direction and gradient and the degree and extent of suspected petroleum contamination at the site. MW1 was installed southeast of the presumed source area (e.g. the two former 4,000-gallon gasoline USTs) in a presumed crossgradient direction. MW2 was installed in the vicinity of the presumed source area, in a presumed downgradient direction. MW3 was installed northwest of the former gasoline UST system, in a presumed downgradient direction. MW4 was installed to the northeast of the former gasoline USTs, in a presumed upgradient direction.

The monitoring wells were constructed of 1.5-inch diameter Schedule 40 PVC riser and 0.010-inch factory slotted, well screen. The length of the riser and the screened section of pipe varied depending on the depth of the well. The annulus between the well screen and the borehole was filled with a sand pack to just above the well screen. A bentonite seal was placed above the sand pack. To complete the construction of each well, a road box was set in concrete at grade level. In addition, locking well caps were placed on the monitoring wells. Specific well construction details are displayed in the detailed well logs included in Appendix B.

MW1

The boring for MW1 was advanced to 14.5 feet below grade. Soils from the boring from MW1 consisted of poorly graded sand from 0.5 to 10 feet below grade. Well graded sand was observed between 10 and 11 feet below grade. Wet, silt was observed from 11 to 14.5 feet below grade. Soil samples collected for PID screening had a maximum reading of 158 ppm, measured in soils collected between 10 and 11 feet.

Groundwater was encountered at approximately 8.5 feet below grade. The screened section of the well was installed from 13.5 to 3.5 feet below the ground surface.

MW2

The boring for MW2 was advanced to 14.5 feet below grade. Soils from the boring consisted of poorly graded sand from 0.5 to 10 feet below grade. Well graded sand was observed between 10 and 11 feet below grade. Soils collected between 11 and 12 feet below grade consisted of silty sand. Soils collected between 12 and 14.5 feet below grade consisted of silt. Elevated VOC levels were detected using the PID. The maximum reading was 142 ppm at 10 to 11 feet below

grade. Groundwater was encountered at 8.5 feet below grade. The screened section of the well was installed from 13.5 to 3.5 feet below grade.

MW3

The boring for MW3 was advanced to 14.5 feet below grade. Soils from the boring consisted of poorly graded sand from 0.5 to 8.5 feet below grade. Silt was observed between 8.5 and 14.5 feet below grade. Soil samples collected for PID screening had a maximum reading of 98 ppm, measured in soils collected between 8.5 and 9.5 feet.

Groundwater was encountered at 8.5 feet below grade. The screened section of the well was installed from 13.5 to 3.5 feet below grade.

MW4

The boring for MW4 was advanced to 14.5 feet below grade. Soils from the boring consisted of poorly graded sand from 0.5 to 1 foot below grade. Sandy organic soil was observed between 1 and 1.5 feet below grade. Soils between 1.5 and 4.5 feet below grade consisted of poorly graded sand. Well graded sand was observed between 4.5 and 11 feet below grade. Silt was observed 11 and 14.5 feet below grade. Elevated VOC levels were detected in the soil samples collected from this boring. The maximum reading was 130 ppm in soils collected between 9.5 and 11 feet below grade.

Groundwater was encountered at 8.5 feet below grade. The screened section of the well was installed from 13.5 to 3.5 feet below grade.

B. Determination of Groundwater Flow Direction and Gradient

Water table elevation measurements were collected from three of the four monitoring wells (MW1, MW3, MW4) on July 30, 1999 using a Keck interface probe. The water table elevation in MW2 was not measured because the technician visiting the site could not locate the correct monitoring well, and instead located a well installed for Hauke Building Supply. The interface probe could not fit into this monitoring well, and a measurement was not made. The measurements from the three on-site monitoring wells were subtracted from the top of casing elevations, which were determined relative to an arbitrary datum of 100 feet at the top of the casing for MW4, to determine the water table elevation at each of the wells. Groundwater level data are recorded in Appendix C. No free phase petroleum product was observed in any of the monitoring wells gauged on July 30, 1999.

As displayed in the groundwater contour map included in Appendix A, the groundwater flow direction for July 30, 1999 appears to flow to the west toward Lake Champlain at a hydraulic

gradient of 1.6%. Under the groundwater flow regime described, MW1 and MW4 are located upgradient of the expected source area, MW2 is located in the vicinity of the source area, and MW3 is located downgradient of the pump island, and crossgradient of the former UST system.

C. Groundwater Sample Collection and Analysis

Groundwater samples were collected from MW1, MW3, and MW4 immediately following well gauging on May 7, 1999. Samples were analyzed for the presence of VOCs per EPA Method 8021B. A second visit was made to A & D Service Center on August 2, 1999 in order to locate and sample MW2. One sample was collected from MW2 during this visit, and submitted for analysis by EPA Method 8021B. Results of the laboratory analyses are summarized in Appendix D. Laboratory report forms are presented in Appendix E.

Concentrations of benzene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and MTBE were detected in MW1at levels above their respective Vermont Groundwater Enforcement Standards (VGESs). Concentrations of 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and napthalene were detected in MW2 in excess of their VGESs. Concentrations o f 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene exceed the VGES in MW3 and MW4.

The highest contaminant concentrations were observed in MW2, located in the vicinity of the two former 4,000-gallon gasoline USTs, where subsurface petroleum contamination was originally detected. Lower contaminant concentrations were measured in the crossgradient monitoring wells, (MW1 and MW3), and in the upgradient monitoring well, MW4. Contaminant concentrations in the upgradient and crossgradient locations are presumably due to contaminant diffusion from the source area, and may also be due to small surface spills in the pump areas migrating downward, through the sandy soils beneath this site, to the less permeable silt layer.

All samples were collected according to Griffin's groundwater sampling protocol, which complies with industry and state standards. Results from the analyses of the trip blank and duplicate samples indicate that adequate quality assurance and control (QA/QC) were maintained during sample collection and analysis.

D. Sensitive Receptor Risk Assessment

A receptor risk assessment was conducted to identify known and potential receptors of contamination detected at A & D Service Center. A visual survey was conducted during monitoring well installation. Based on these observations, a determination of the potential risk to identified receptors was made based on proximity to the expected source area (i.e., the former gasoline/diesel UST system), groundwater flow direction, and contaminant concentration levels in groundwater.

Water Supplies

A & D Service Center and other buildings in the area are supplied by municipal water and sewer provided by the City of Burlington. The water supply for the City of Burlington is Lake Champlain.

Buildings in the Vicinity

One building is located on the subject property; the building houses a garage and a small convenience store. The on-site building is constructed on slab foundation.

The nearest buildings to the A & D Service Center are a True Value Hardware Store, and the Ethan Allen Shopping Center, each located less than 150 feet from the source area. Both of these structures are constructed on slab foundations.

Environmental risk to buildings surrounding the A & D Service Center is considered minimal, given that the buildings do not have basements, which would allow the potential accumulation of petroleum vapors, and that they are serviced by a municipal water supply. Additionally, the depth to groundwater is approximately 8.5 feet below grade, which also minimizes potential risks to the buildings via petroleum vapor migration. The majority of the area surrounding these buildings is paved, reducing the potential for exposure to the petroleum compounds through dermal contact with soils or inhalation of vapors. Groundwater elevations are also lower than the average depth of utility corridors (3 to 5 feet), which minimizes the potential for petroleum migration along utility corridors, which may be located in the site vicinity.

Surface Water

The nearest surface water to the site is Lake Champlain, which is located approximately 2500 feet west of A & D Service Center. Lake Champlain is downgradient of the source area, however, given its sufficient distance from the source area at A & D Service Center, it is not believed to be at significant risk of petroleum contamination.

IV. CONCLUSIONS

Based on the initial site investigation of petroleum contamination at A & D Service Center, the following conclusions are offered:

1. There has been an apparent release of gasoline in the subsurface at the subject site.

2. Four shallow monitoring wells were installed at the site on July 15, 1999, to evaluate the degree and extent of subsurface petroleum contamination detected during the closure inspection of gasoline and diesel USTs in September 1998.

3. VOC readings of soils collected during the UST removal in September 1999 and during monitoring well installation on July 15, 1999 indicate that adsorbed petroleum compounds exist in the soils beneath the A&D Service Station. The highest VOC concentrations were measured at depths between 8.5 and 11 feet below grade, and were measured primarily in sands directly overlying the silt layer beneath the site. The petroleum-contaminated soils at the A&D Service Station site are paved over, and are not readily accessible, reducing risk to potential receptors. With the source USTs closed, it is expected that adsorbed petroleum compound concentrations will decrease over time with the progressive action of natural mitigative processes including biodegradation, volatilization, and diffusion.

4. Water table elevation data collected on July 30, 1999 indicate that groundwater in the overburden aquifer beneath the site flows to the west at a hydraulic gradient of approximately 1.6%.

5. Groundwater elevations are lower than the average depth of utility corridors (3 to 5 feet), which minimizes the potential for petroleum migration along utility corridors, which may be located in the site vicinity.

6. The groundwater samples collected for laboratory analysis on July 30, 1999 and August 2, 1999 were contaminated with select petroleum related compounds at concentrations exceeding VGESs.

7. The downgradient extent of the contaminant plume has not been defined with the current well array.

8. No free product was present in the on-site wells during sampling on July 30, 1999 and August 2, 1999.

9. Receptors in the vicinity of the site which have been identified as being at potential risk of impact from subsurface petroleum contamination are the buildings in the vicinity of A & D Service Center, and Lake Champlain. Risk to buildings in the area is considered minimal at this time, given that they are serviced by municipal water and sewer and that the area is paved. Risk to Lake Champlain is considered minimal given its distance from the source area.

10. With the apparent source removed (i.e., the former gasoline and diesel UST system), and barring the identification of an additional source, it is expected that, over time, the natural

processes of dilution, dispersion, and biodegradation will reduce dissolved contaminant concentrations present in groundwater beneath the A & D Service Center site.

V. RECOMMENDATION

Based upon the above conclusions, Griffin presents the following recommendations:

1. Since select compounds were detected at concentrations exceeding their respective VGES, a confirmatory round of groundwater elevations and samples should be collected from the four monitoring wells during the Fall of 1999. Following review of data from this second round of groundwater sampling and analysis, recommendations regarding future activities at the site will be made.

VI. REFERENCES

1. Griffin International Inc., October 5, 1998. UST Closure Letter Report from Willis Doe to Susan Thayer (VTDEC) re: A & D Service Center UST Closure Inspection, UST Facility 8632338.

2. Doll, Charles G., ed., 1970, *Surficial Geologic Map of Vermont*, State of Vermont.

3. Doll, Charles G., ed., 1961, *Centennial Geologic Map of Vermont*, State of Vermont.

4. USGS 7.5 Minute Topographic Quadrangle Map. 1948, photo-revised 1987. Burlington, Vermont.

APPENDIX A

Maps

Job #: 39941497

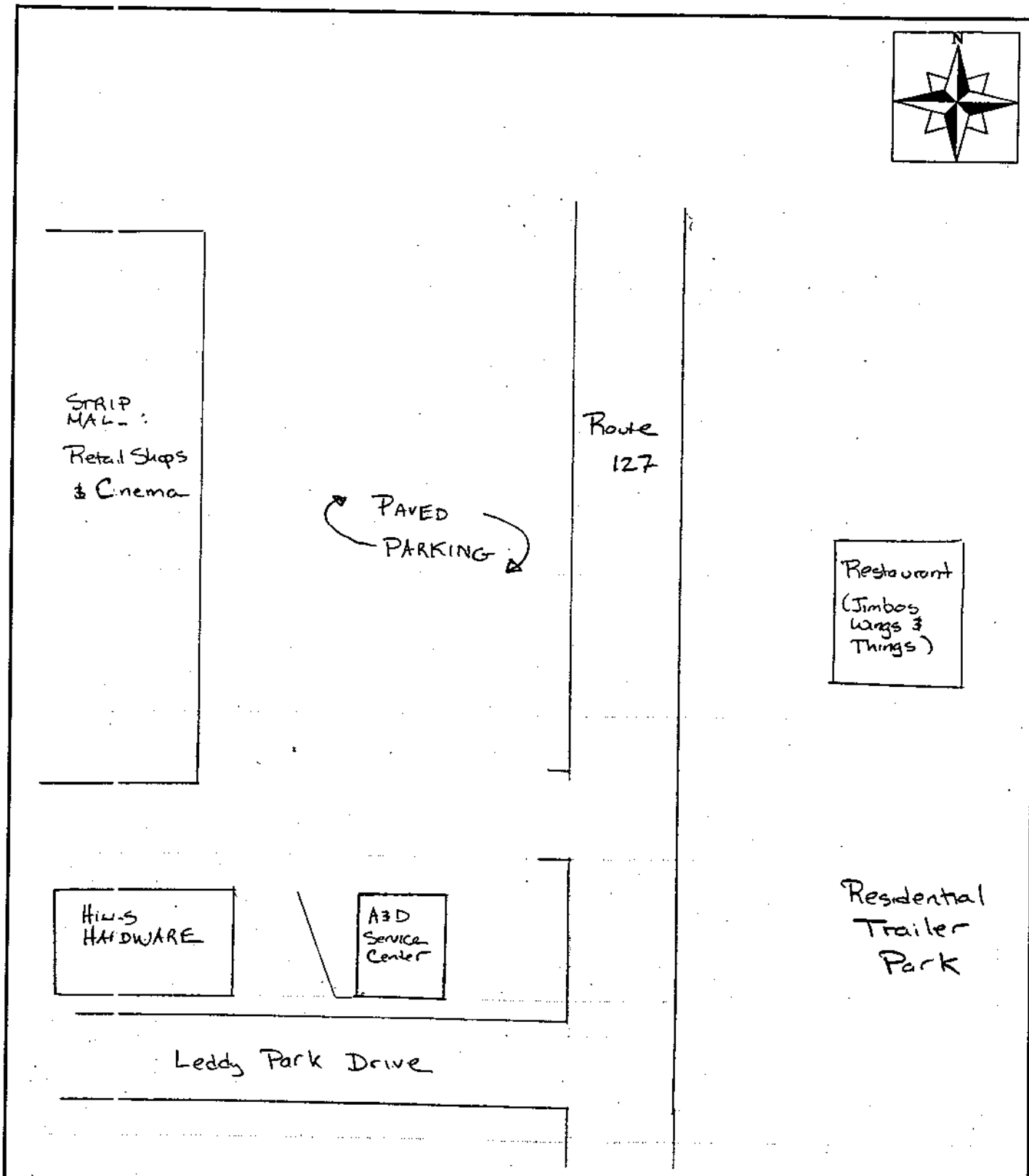
GRIFFIN INTERNATIONAL

A&D SERVICE STATION

1097 NORTH AVENUE, BURLINGTON, VT

SITE LOCATION MAP

Date:	Source:	Scale:
9/23/99	USGS 7.5 Minute Topographic Quadrangle Map. Burlington, VT 1948, photorevised 1987	1"=2000'



Job #: 39941497

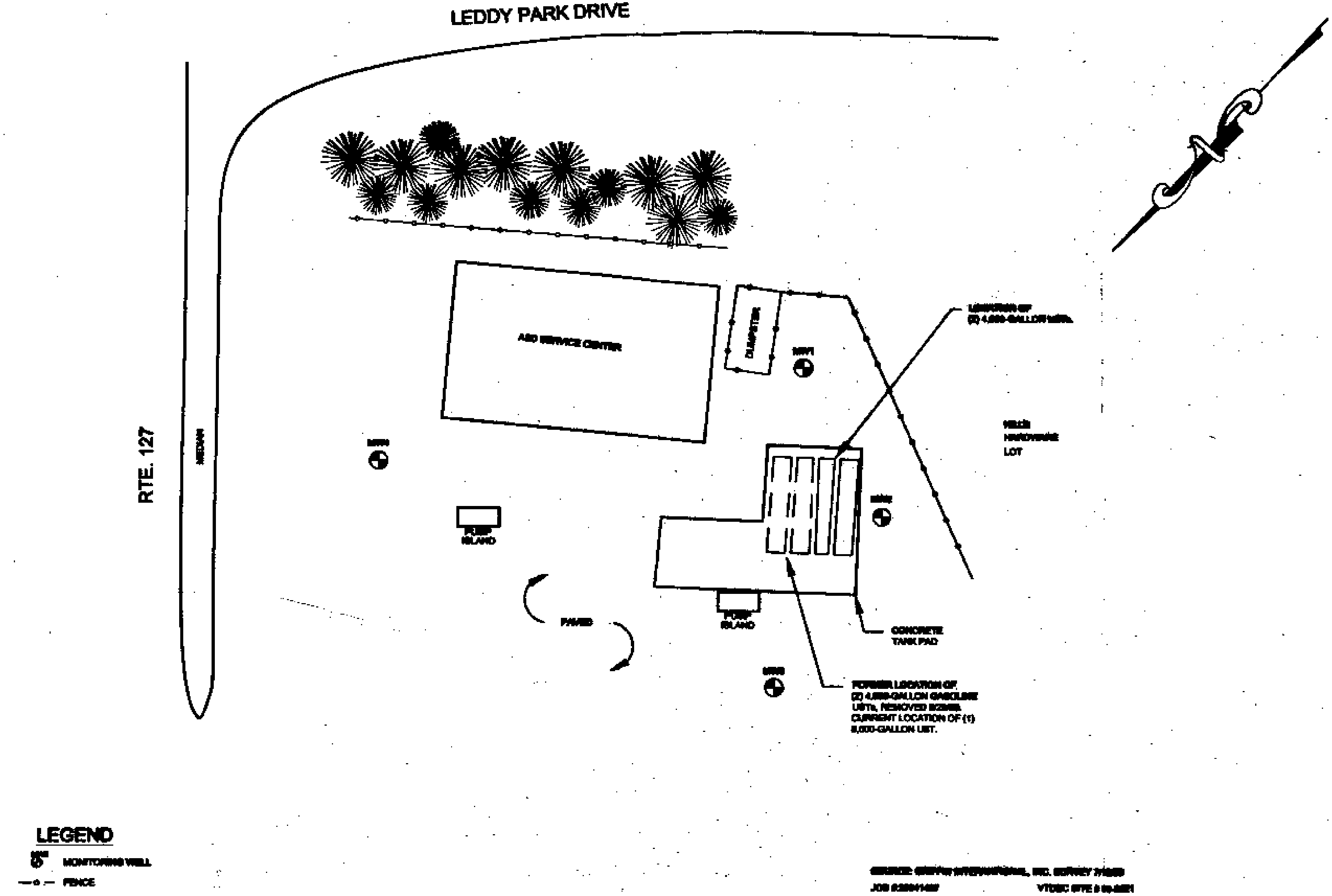
GRIFFIN INTERNATIONAL

A&D SERVICE STATION

1097 NORTH AVENUE, BURLINGTON, VT

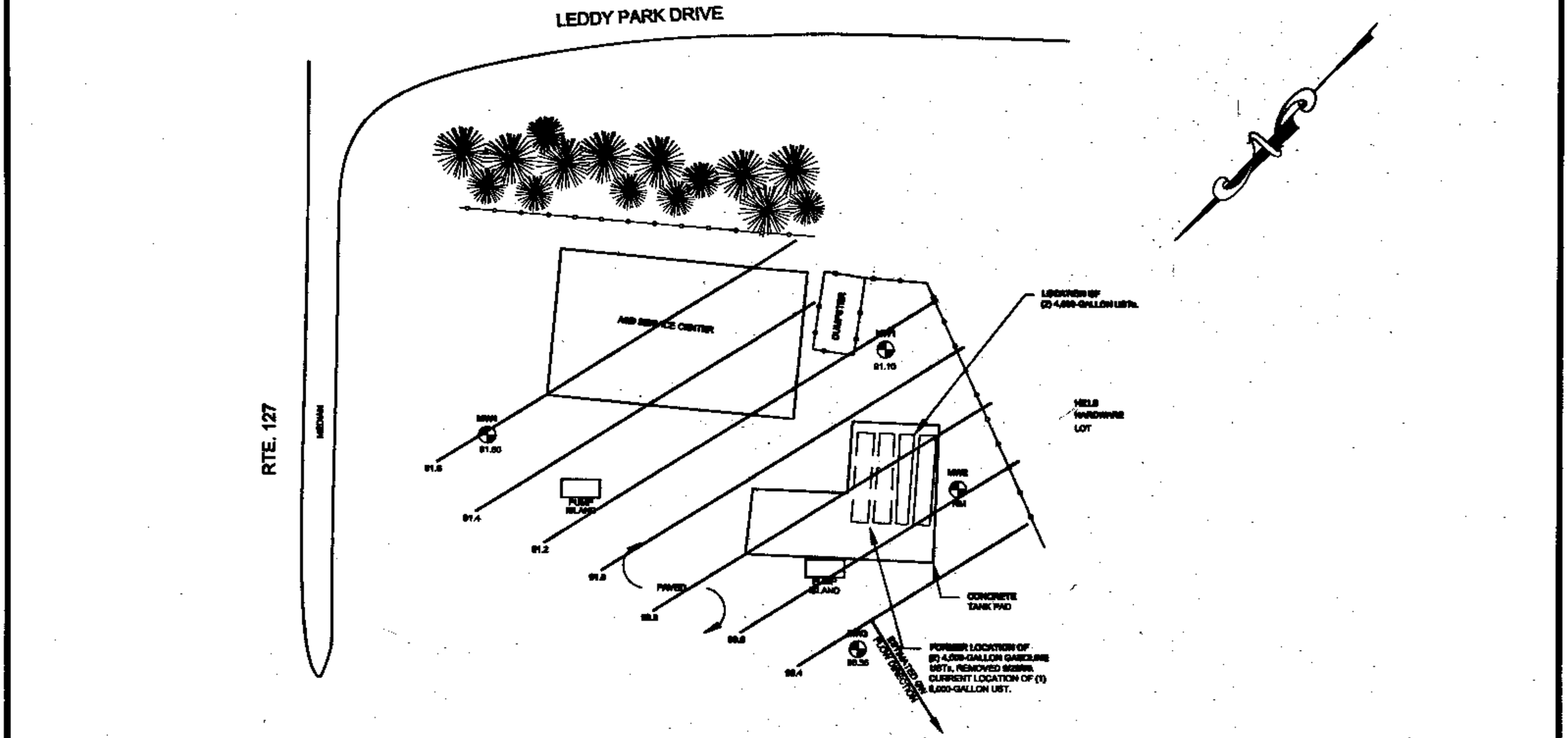
AREA MAP

Date: 10/7/99	Source: BS Site Sketch	Scale: nts



GRIFFIN INTERNATIONAL

A & D SERVICE STATION 1097 NORTH AVENUE BURLINGTON, VERMONT				
SITE MAP				
DATE: 7/20/99	DWG.#: 1	SCALE: 1" = 20'	DRN.: JL	APP.: BS



LEGEND

- MW1 — MONITORING WELL WITH GROUNDWATER LEVEL ELEVATION
- —o— FENCE
- GROUNDWATER CONTOUR IN FEET (DASHED WHERE INFERRED)
- NM — NOT MEASURED

SOURCE: GRIFFIN INTERNATIONAL, INC. SURVEY 7/1999
JOB #:39941497 VTDEC SITE # 99-0021

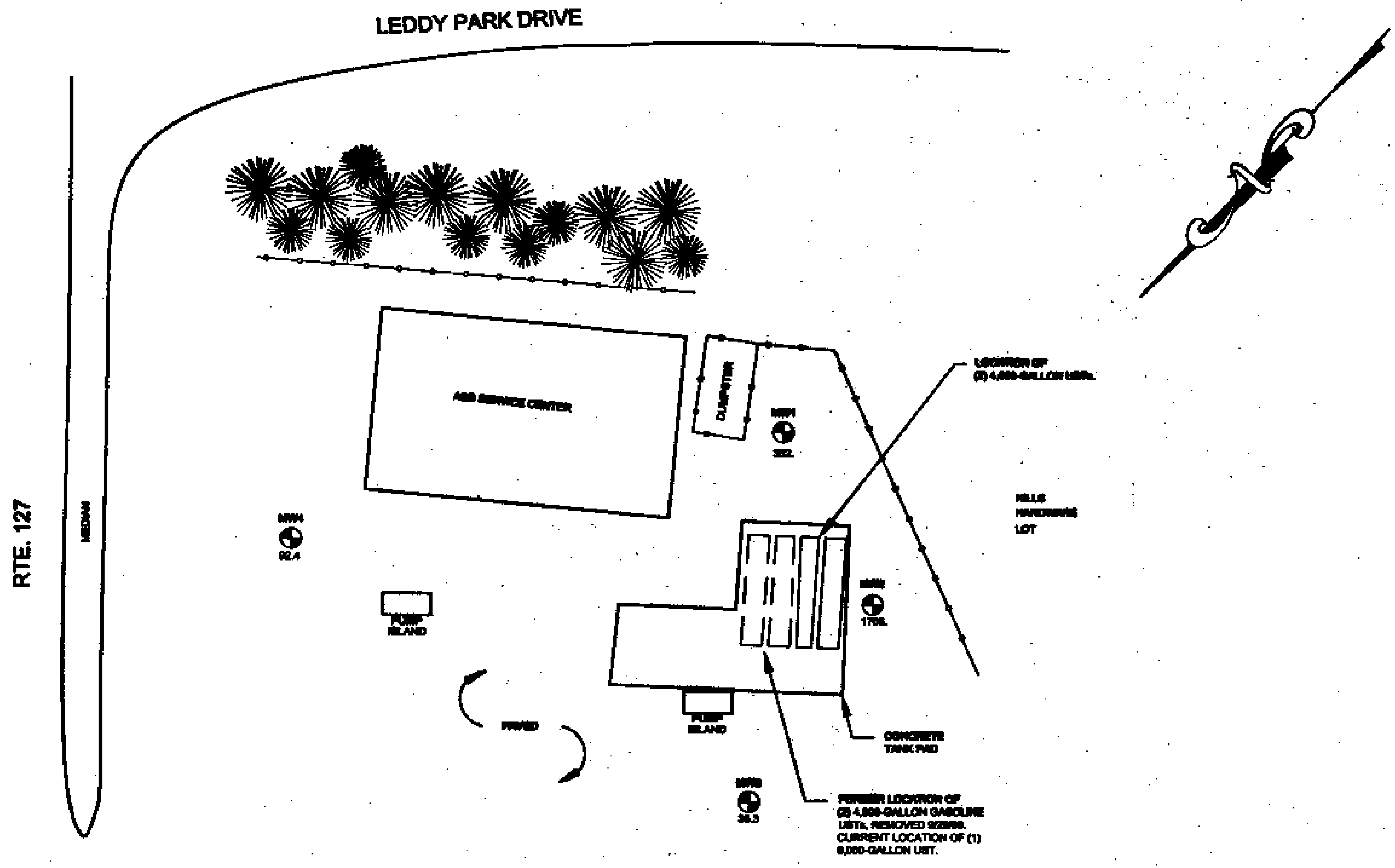
GRIFFIN INTERNATIONAL

A & D SERVICE STATION

1097 NORTH AVENUE
BURLINGTON, VERMONT

GROUNDWATER CONTOUR MAP
MEASURED 7/30/99

DATE: 7/20/99	DWG.#: 2	SCALE: 1" = 20'	DRN.: JL	APP.: BS



LEGEND

- FENCE
- ND NONE DETECTED

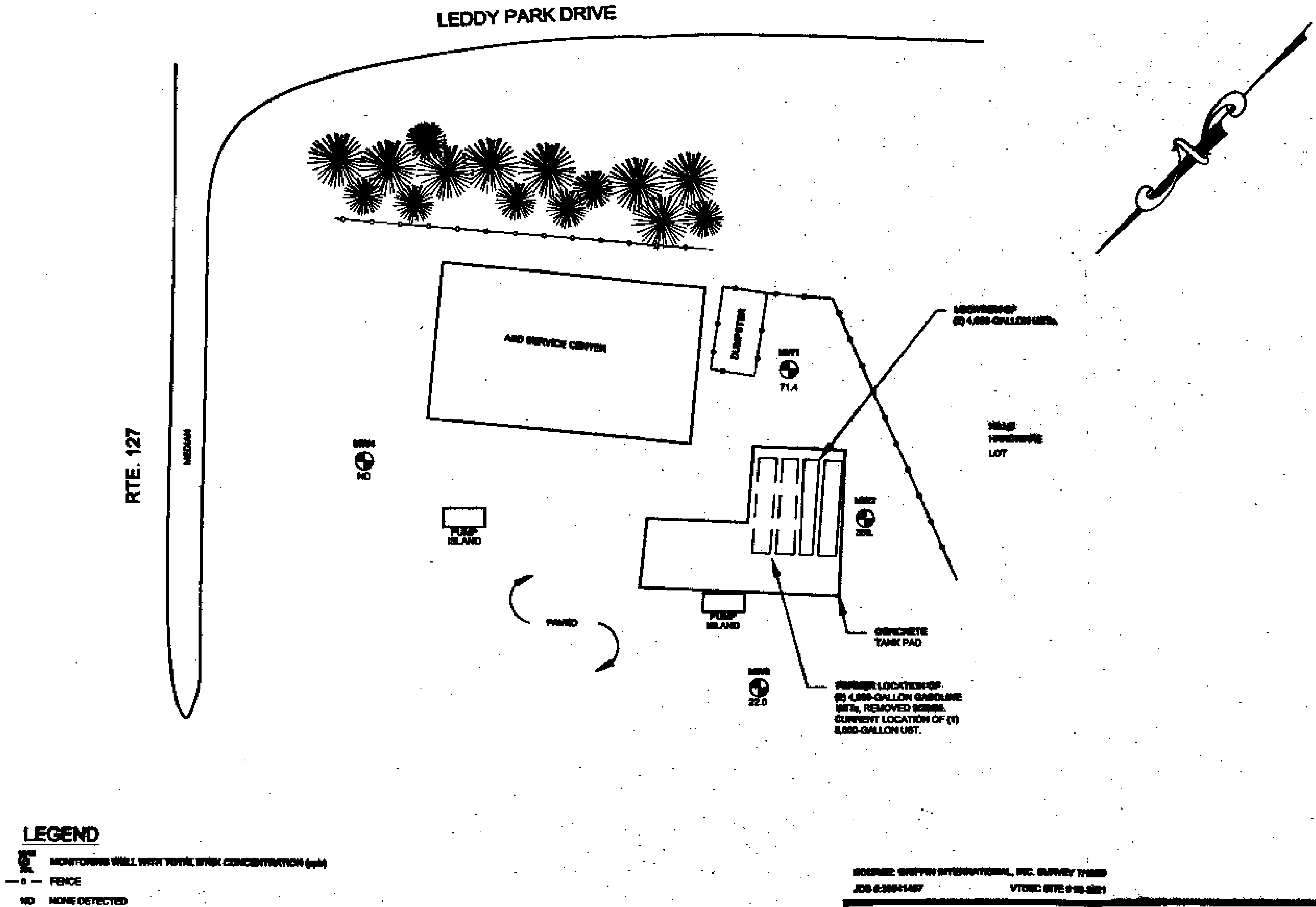
A & D SERVICE STATION

1097 NORTH AVENUE
BURLINGTON, VERMONT

CONTAMINANT CONCENTRATION MAP

TOTAL TARGETED VOCs - METHOD 8021B

GRIFFIN INTERNATIONAL



A & D SERVICE STATION

1097 NORTH AVENUE
BURLINGTON, VERMONT

CONTAMINANT CONCENTRATION MAP

DATE: 7/20/99	DWG.#: 4	SCALE: 1" = 20'	DRN.: JL	APP.: BS

APPENDIX B

Well Logs

WELL NUMBER MW1

PROJECT A&D SERVICE CENTER

LOCATION BURLINGTON, VT

DATE DRILLED 7/15/99 TOTAL DEPTH OF HOLE 14.5'

DIAMETER 2.75"

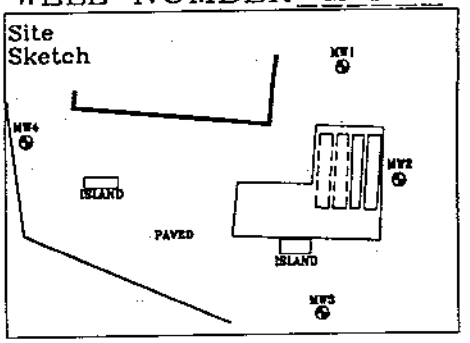
SCREEN DIA. 1.5" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 2.8' TYPE sch 40 pvc

DRILLING CO. ADAMS ENG. DRILLING METHOD VIBRATORY

DRILLER GERARD ADAMS LOG BY B. STOPFORD

Site Sketch



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE			1
2		BENTONITE	0.5'–4.5' 1.2 ppm	POORLY GRADED SAND (SP) 100% fine sand, poorly graded, dry, light brown & orange	2
3		WELL RISER			3
4					4
5					5
6		SAND PACK	4.5'–9.5' 0 ppm	POORLY GRADED SAND (SP) 100% medium sand, poorly graded, dry to moist, light brown & red	6
7					7
8				8.5' WATER TABLE ▼	8
9					9
10		WELL SCREEN	9.5'–10' 11.0 ppm	POORLY GRADED SAND (SP) 100% medium sand, poorly graded, moist, light brown	10
11			10'–11' 158 ppm	WELL GRADED SAND (SW) 100% medium sand, well graded, moist to wet, gray, petroleum odor	11
12			11'–12.5' 1.8 ppm	SILT (ML) 100% silt, moist to wet, gray & red layers	12
13		BOTTOM CAP			13
14			12.5'–14.5' 8.2 ppm	SILT (ML) 100% silt, wet, olive gray	14
15		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 13.5' END OF EXPLORATION AT 14.5'	15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT A&D SERVICE CENTER

LOCATION BURLINGTON, VT

DATE DRILLED 7/15/99 TOTAL DEPTH OF HOLE 14.5'

DIAMETER 2.75"

SCREEN DIA. 1.5" LENGTH 10' SLOT SIZE 0.010"

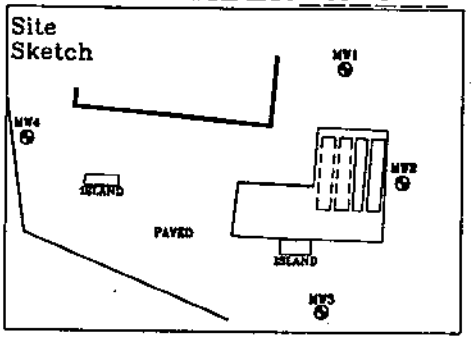
CASING DIA. 1.5" LENGTH 2.8' TYPE sch 40 pvc

DRILLING CO. ADAMS ENG. DRILLING METHOD VIBRATORY

DRILLER GERARD ADAMS LOG BY B. STOPFORD

WELL NUMBER MW2

Site Sketch



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX			0
1		LOCKING WELL CAP			1
2		CONCRETE			2
3		BENTONITE	0.5'–4.5' 1.4 ppm	POORLY GRADED SAND (SP) 100% fine sand, poorly graded, dry, light brown & red	3
4		WELL RISER			4
5			4.5'–5.5' 1.0 ppm	POORLY GRADED SAND (SP) 100% fine sand, poorly graded, dry, light brown & red	5
6		SAND PACK		POORLY GRADED SAND (SP) 100% medium sand, poorly graded, dry, gray & brown	6
7			5.5'–9.5' 0.2 ppm		7
8				8.5' WATER TABLE ▼	8
9		WELL SCREEN			9
10			9.5'–10' 0 ppm	POORLY GRADED SAND (SP) 100% medium sand, poorly graded, wet, gray & brown	10
11			10'–11' 142 ppm	WELL GRADED SAND (SW) 100% fine to coarse sand, well graded, wet, light brown & black, trace silt–black staining	11
12					12
13		BOTTOM CAP	11'–12' 4.9 ppm	SILTY SAND (SM) 30% silt; 70% fine sand, poorly graded, wet, light brown to olive gray	13
14			12'–14.5' 2.6 ppm	SILT (ML) 100% silt, wet, olive gray & red layers	14
15		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 13.5' END OF EXPLORATION AT 14.5'	15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

WELL NUMBER MW3

PROJECT A&D SERVICE CENTER

LOCATION BURLINGTON, VT

DATE DRILLED 7/15/99 TOTAL DEPTH OF HOLE 14.5'

DIAMETER 2.75"

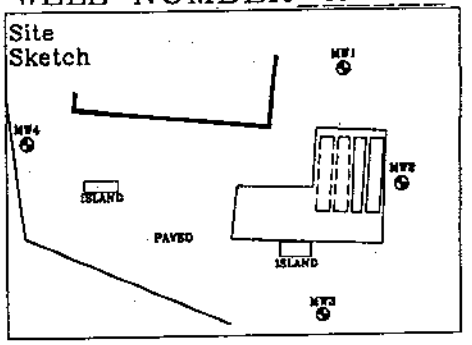
SCREEN DIA. 1.5" LENGTH 10' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 2.8' TYPE sch 40 pvc

DRILLING CO. ADAMS ENG. DRILLING METHOD VIBRATORY

DRILLER GERARD ADAMS LOG BY B. STOPFORD

Site Sketch



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP CONCRETE			0
1		BENTONITE	0.5'–4.5' 2.8 ppm	POORLY GRADED SAND (SP) 100% fine sand, poorly graded, dry, light brown, red, gray, no odor, trace silt	1
2					2
3		WELL RISER			3
4					4
5			4.5'–6.5' 8.1 ppm	POORLY GRADED SAND (SP) 100% medium sand, poorly graded, dry, light brown	5
6		SAND PACK			6
7			6.5'–8.5' 50 ppm	POORLY GRADED SAND (SP) 100% medium sand, poorly graded, dry, light brown & gray, thin layer near bottom stained black with strong petroleum odor 8.5' WATER TABLE	7
8					8
9					9
10		WELL SCREEN	8.5'–9.5' 98 ppm	SILT (ML) 100% silt, moist to wet, olive gray, light brown and red	10
11					11
12			9.5'–13' 12 ppm	SILT (ML) 100% silt, wet, olive gray, light brown and red layers	12
13		BOTTOM CAP			13
14			13'–14.5' 7.4 ppm	SILT (ML) 100% silt, wet, olive gray	14
15		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 13.5' END OF EXPLORATION AT 14.5'	15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

PROJECT A&D SERVICE CENTER

LOCATION BURLINGTON, VT

DATE DRILLED 7/15/99 TOTAL DEPTH OF HOLE 14.5'

DIAMETER 2.75"

SCREEN DIA. 1.5" LENGTH 10' SLOT SIZE 0.010"

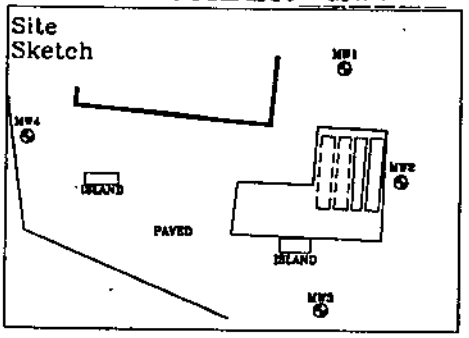
CASING DIA. 1.5" LENGTH 2.8' TYPE sch 40 pvc

DRILLING CO. ADAMS ENG. DRILLING METHOD VIBRATORY

DRILLER GERARD ADAMS LOG BY B. STOPFORD

WELL NUMBER MW4

Site Sketch



GRIFFIN INTERNATIONAL, INC

DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
0		ROAD BOX LOCKING WELL CAP			0
1		CONCRETE	0.5'–1' not measured	POORLY GRADED SAND (SP) 100% medium sand, poorly graded, dry	1
2		BENTONITE	1'–1.5' 2 ppm	SANDY ORGANIC SOIL (OL–OH) 35% silt; 65% fine sand, well graded, dry, dark brown	2
3		WELL RISER	1.5'–4.5' 0 ppm	POORLY GRADED SAND (SP) 100% fine sand, poorly graded, dry, light brown	3
4					4
5			4.5'–6.5' 0.1 ppm	WELL GRADED SAND (SW) 100% fine to medium sand, well graded, moist, light brown and red	5
6		SAND PACK			6
7			6.5'–9.5' 14.6 ppm	WELL GRADED SAND (SW) 90% medium sand, 10% fine gravel, well graded, moist, gray	7
8					8
9				8.5' WATER TABLE ▼	9
10		WELL SCREEN	9.5'–11' 130 ppm	WELL GRADED SAND (SW) 100% medium to coarse sand, well graded, wet, gray brown, trace fines	10
11					11
12					12
13		BOTTOM CAP	11'–14.5' 2.9 ppm	SILT (ML) 100% silt, wet, gray, red and light brown layers	13
14					14
15		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 13.5' END OF EXPLORATION AT 14.5'	15
16					16
17					17
18					18
19					19
20					20
21					21
22					22
23					23
24					24
25					25

APPENDIX C

Liquid Level Monitoring Data

A & D Service Station
1097 North Avenue
Burlington, VT

Liquid Level Monitoring Data

Sample Date: 7/30/99

Well I.D.	Well Depth btoc	Top of Casing Elevation	Depth To Product btoc	Depth To Water btoc	Product Thickness	Specific Gravity Of Product	Water Equivalent	Corrected Depth To Water	Corrected Water Table Elevation
MW1	-	99.60	-	8.50	-	-	-	-	91.10
MW2	-	99.60	-	nm	-	-	-	-	nm
MW3	-	99.18	-	8.82					90.36
MW4	-	100.00	-	8.40	-	-	-	-	91.60

All Values Reported in Feet
btoc - Below Top of Casing
Elevations determined relative to top of casing of MW4, which was arbitrarily set at 100'
Site surveyed by Griffin International, Inc. on July 15, 1999
nm - not measured

Modified 09/15/1999

APPENDIX D

Groundwater Quality Summary Data

A & D Service Station
1097 North Avenue
Burlington, VT

Groundwater Quality Summary

Sample Date: 7/30/99

PARAMETER	MW1	MW2	MW3	MW4	VGES
Benzene	28.3	not	1.4	TBQ(1)	5
Toluene	2.2	sampled	TBQ(1)	TBQ(1)	1,000
Ethylbenzene	19.1		2.7	ND(1)	700
Xylenes	21.8		17.9	7.5	10,000
Total BTEX	71.4		22.0	ND	-
1,3,5 Trimethyl Benzene	20.3		5.0	22.3	4
1,2,4 Trimethyl Benzene	109.		8.7	65.7	5
Napthalene	13.1		2.6	4.4	20
MTBE	118.		ND(10)	ND(10)	40
Total Targeted VOCs	332.		38.3	92.4	-

Sample Date: 8/2/99

PARAMETER	MW1	MW2	MW3	MW4	VGES
Benzene	not	nd(10)	not	not	5
Toluene	sampled	nd(10)	sampled	sampled	1,000
Ethylbenzene		92.5			700
Xylenes		265.			10,000
Total BTEX		358.			-
1,3,5 Trimethyl Benzene		305.			4
1,2,4 Trimethyl Benzene		939.			5
Napthalene		104.			20
MTBE		nd(20)			40
Total Targeted VOCs		1,706.			-

TBQ( ): Trace below quantitation limit (quantitation limit)
ND( ): Not detected (detection limit)
All values in ug/L (ppb) unless noted
Analysis by EPA Method 8021B
VGES = Vermont Groundwater Enforcement Standards (Vermont Groundwater Protection Rule and Strategy, 11/15/97)

Modified 09/15/1999

A & D Service Station
1097 North Avenue
Burlington, VT

Quality Assurance and Control Samples
Sample Date: July 30, 1999

PARAMETER	Trip Blank	Duplicate (MW-1)	VGES
Benzene	ND(1)	**120.**	5
Toluene	ND(1)	26.3	1,000
Ethylbenzene	ND(1)	TBQ(2)	700
Xylenes	ND(1)	15.9	10,000
Total BTEX	**ND**	**162.**	
1,3,5 Trimethyl Benzene	ND(1)	**18.1**	4
1,2,4 Trimethyl Benzene	ND(1)	**15.8**	5
Napthalene	ND(1)	**89.**	20
MTBE	ND(10)	11.0	40
Total Targeted VOCs	**ND**	**296.**	

Analysis by EPA Method 8021B
All Values Reported in ug/l (ppb)
ND( ) = None detected (detection limit)
TBQ( ) = Trace below quantitation (detection limit)
VGES = Vermont Groundwater Enforcement Standards (Vermont Groundwater Protection Rule and Strategy, 11/15/97)

Modified 09/15/1999

APPENDIX E

Laboratory Analysis Reports

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Griffin International
PROJECT: A&D Service Station/#39941497
REPORT DATE: August 13, 1999

ORDER ID: 3412
DATE RECEIVED: August 3, 1999

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits, unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

CLIENT: Griffin International
PROJECT: A&D Service Station/#39941497
REPORT DATE: August 13, 1999

ORDER ID: 3412
DATE RECEIVED: August 3, 1999
SAMPLER: BS
ANALYST: 725

Ref. Number: 142080 | Site: MW 2 | Date Sampled: August 2, 1999 | Time: 4:00 PM

Parameter	Result	Unit	Method	Analysis Date
MTBE	< 20.0	ug/L	SW 8021B	8/12/99
Benzene	< 10.0	ug/L	SW 8021B	8/12/99
Toluene	< 10.0	ug/L	SW 8021B	8/12/99
Ethylbenzene	92.5	ug/L	SW 8021B	8/12/99
Xylenes, Total	265.	ug/L	SW 8021B	8/12/99
1,3,5 Trimethyl Benzene	305.	ug/L	SW 8021B	8/12/99
1,2,4 Trimethyl Benzene	939.	ug/L	SW 8021B	8/12/99
Naphthalene	104.	ug/L	SW 8021B	8/12/99
UIP's	> 10.		SW 8021B	8/12/99
Surrogate	101.	%	SW 8021B	8/12/99

ENDYNE, INC.

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

1-Org

34259

CHAIN-OF-CUSTODY RECORD

Project Name: 3994/497 Site Location: A & D Citgo	Reporting Address: Griffin Int'l	Billing Address:
Endyne Project Number: 3412	Company: Griffin Contact Name/Phone #: Rob Stopford	Sampler Name: Rob Stopford Phone #: 802-265-4288

Lab #	Sample Location	Matrix	GRAB	COMP	Date/Time	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
142080	MW2	H_2O	✓		8/2/99/1600	2	G/40		8021B	HCl	

Relinquished by: Signature Rob Stopford — Received by: Signature [illegible] — Date/Time 8-3-99

Relinquished by: Signature [illegible] — Received by: Signature Alison Howard — Date/Time 8/3/99 10:05

New York State Project: Yes ____ No ✓

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD_5	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International
PROJECT NAME: A&D Service Station
REPORT DATE: August 11, 1999
DATE SAMPLED: July 30, 1999

ORDER ID: 3380
REF.#: 141,939 - 141,943

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures

ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: A&D Service Station
CLIENT PROJ. #: 39941497

DATE RECEIVED: August 2, 1999
REPORT DATE: August 11, 1999
ORDER ID: 3380

Ref. #:	141,939	141,940	141,941	141,942	141,943
Site:	Trip Blank	MW-1	Duplicate	MW-3	MW-4
Date Sampled:	7/30/99	7/30/99	7/30/99	7/30/99	7/30/99
Time Sampled:	9:10	3:12	3:15	3:17	3:20
Sampler:	J.R.	J.R.	J.R.	J.R.	J.R.
Date Analyzed:	8/10/99	8/11/99	8/11/99	8/10/99	8/10/99
UIP Count:	0	>10	>10	>10	>10
Dil. Factor (%):	100	50	50	100	100
Surr % Rec. (%):	94	94	98	98	89
Parameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
MTBE	<10	118.	120.	<10	<10
Benzene	<1	28.3	26.3	1.4	TBQ <1
Toluene	<1	2.2	TBQ <2	TBQ <1	TBQ <1
Ethylbenzene	<1	19.1	15.9	2.7	<1
Xylenes	<1	21.8	18.1	17.9	7.5
1,3,5 Trimethyl Benzene	<1	20.3	15.8	5.0	22.3
1,2,4 Trimethyl Benzene	<1	109.	89	8.7	65.7
Naphthalene	<1	13.1	11.0	2.6	4.4

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated

ENDYNE, INC.

32525

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

JOB# 39941497

CHAIN-OF-CUSTODY RECORD

Project Name: A+D Service Station Site Location: Burlington Vt.	Reporting Address: Griffin	Billing Address: Griffin
Endyne Project Number: 3380	Company: Griffin Contact Name/Phone #: BS	Sampler Name: T. Rocklin Phone #:

Lab #	Sample Location	Matrix	GRAB	COMP	Date/Time 7/30/99	Sample Containers No.	Sample Containers Type/Size	Field Results/Remarks	Analysis Required	Sample Preservation	Rush
141939	TRIP BLANK	H_2O	✓		9:10	2	40ml		8021B	HCl	
141940	MW-1				15:12						
141941	DUPLICATE MW-1				15:15						
~~141942~~	~~[illegible]~~				~~[illegible]~~						
141942	MW-3				15:17						
141943	MW-4	↓	↓		15:20	↓	↓		↓	↓	

Relinquished by: Signature [signature]	Received by: Signature [signature]	Date/Time 8/[illegible]/99 10:25
Relinquished by: Signature [signature]	Received by: Signature [signature]	Date/Time 8/[illegible]/99 [illegible]

New York State Project: Yes ____ No ✓

Requested Analyses

1	pH	6	TKN	11	Total Solids	16	Metals (Specify)	21	EPA 624	26	EPA 8270 B/N or Acid
2	Chloride	7	Total P	12	TSS	17	Coliform (Specify)	22	EPA 625 B/N or A	27	EPA 8010/8020
3	Ammonia N	8	Total Diss. P	13	TDS	18	COD	23	EPA 418.1	28	EPA 8080 Pest/PCB
4	Nitrite N	9	BOD_5	14	Turbidity	19	BTEX	24	EPA 608 Pest/PCB		
5	Nitrate N	10	Alkalinity	15	Conductivity	20	EPA 601/602	25	EPA 8240		
29	TCLP (Specify: volatiles, semi-volatiles, metals, pesticides, herbicides)										
30	Other (Specify):										